

Port Reitz near Mombasa: the size agrees with E. l. redimita, though by zoogeographical reasons one would expect large E. l. lamarckii. As Mr. R. S. Benton at Nairobi, who collected most of these specimens alive at Port Reitz, kindly has given 36 shells to the writer and has carefully measured and described the remaining 88 specimens, the ocellation of each shell is known: in 37 percent there are no traces of purplish ocelli in the white dots (as it is in E. l. redimita), in 31 percent the ocelli are pale and indistinct, and in 42 percent as distinct as it is in typical E. l. lamarckii; the average size of the shells in these three groups is slightly increasing: 30, 31, and 33 mm. Therefore, the population from Port Reitz seems to be rather intermediate, possibly on account of its living on the northern border of its distribution in East Africa.

In Lyncina carneola (Linnaeus) giant specimens will be observed sometimes; in the Hawaiian Islands there is a distinct contrast between the smaller L. carneola and the large L. leviathan Schilder-Schilder (45 to 90 mm.), which has been recently confirmed ecologically and anatomically by Miss Kay (1961). The common length of both seems to range from 45 to 55 mm. Farther West giant shells (which anatomically belong to L. carneola) are very rare, but they usually cause a slight second summit of the curve of variation, as it is in the large series from Tjilaut Eureun, South Java, and from New Britain (percent of 1'732 and 195 shells, respectively):

20	25	30	35	40	45	50	55	60	65	mm.
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Tjilaut Eureun:

10	50	27	8	3	1	0	1	-	-	%
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New Britain:

1	31	33	18	11	4	1	-	1	-	%
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Shimoni:

-	4	27	15	4	8	8	15	15	4	%
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The last line refers to 26 Lyncina carneola collected by R. S. Benton at Shimoni (see above) in March 1961: there are evidently two varieties in size, which live together in the same place, but there is no difference in the characters of the animal nor in its radula, and both sexes are distributed about equally among the small and large specimens.

The rare Derstolida coxeni (Cox) which is a native of the Solomon Islands, seems to have developed in New Britain a dwarf race varying from 14 to 18 mm. (Ulamona; Rabaul?; "New Britain" in the museum of Hamburg, destroyed) instead of from 19 to 26 mm. (Solomon Islands;

Astrolabe Bay? [Schilder, 1928a]). These smaller shells are also more slender (the breadth is 46 to 51 instead of 49 to 57 percent of the length), have finer teeth (l-p/o-t instead of k-n/n-p according to Schilder, 1958), and the dorsal blotches are dark, coarse, and more confluent. The material available (8 and 12 shells, respectively), however, is too scanty to establish a named Northwestern race of coxeni.

In examples mentioned above the small and the large shells are linked by a continuous series of intermediates. There are some rare exceptions, in which a rare dwarf or giant variety is separated from the more common shells by a broad gap.

The 118 adult Siphocypraea mus (Linnaeus) preserved in European collections vary in size as follows:

30	35	40	45	50	55	60	65	mm.
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11	21	45	11	5	-	3.5	3.5	%
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The gap ranges from 51 to 58 mm. No habitat of the giant variety is known, of which two specimens are preserved in the museum of Copenhagen and in the Dautzenberg collection, while the remaining six shells were preserved in the museum of Hamburg so that one should suppose that they came from the same locality. (These six shells were destroyed during World War II, except for one shell presented to the writer's collection.)

In contrast, in Erronea chinensis (Gmelin) the dwarf shells are widely separated from the typical ones:

5	10	15	20	25	30	35	40	45	50	mm.
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0	3	-	1	15	32	34	12	2	0	%
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In these 257 examined shells, the gap between the nine dwarfs and the usual E. chinensis ranges from 13 to 20 mm.! The former, which have been named E. tortirostris (Sowerby), are restricted to Kowie (Port Alfred), as the indication "Natal" in coll. Tomlin seems not to be reliable. Though Turton (1932, p. 114) declared that he collected also typical "cruenta" (a synonym of E. chinensis) of 25 mm. at Port Alfred, I think all E. tortirostris belong to a degenerate population living in very unfavorable conditions on the Southern border of the species; the minute shells (7 to 12 mm.) show the aperture wide, the labial teeth obsolete, the fossula reduced, and the extremities (especially the left anterior top) pathologically produced. These characters vary in different degrees so that almost normal shells occur which differ from typical E. chinensis only by their minute size (coll. Schilder).

Many collectors are proud to possess the smallest or the largest known adult specimen of a cowry species. When beginning my studies on cowries, I compiled a list of the minimum and maximum length of each species known at that time (Schilder, 1928b); the supplement published the following year (Schilder, 1929), however, proved the extremes to be farther apart when more specimens are examined. Now having measured personally far more than 100'000 cowries, these figures mostly should be replaced by still smaller minima and larger maxima. But instead of publishing a new list of such purely accidental extremes, I prefer to indicate the limits of ninety percent of shells approaching the average length: they may be called "normal" shells, while the five percent minute and the five percent giant shells are "unusual extremes in size". The limits of these "percentiles" hardly change even when the number of examined specimens becomes much increased.

In the following list the species have been arranged, with some slight emendations, according to the writer's last catalogue (Schilder, 1941); the specific names are preceded by the logarithm of the number of measured specimens, and they are followed by two figures indicating the limits of ninety percent in millimeters. The figures have been calculated by my wife, Dr. Maria Schilder.

1.6	<u>teulerei</u>	43-55	2.4	<u>eglantina</u>	42-70
0.8	<u>fultoni</u>	55-61	2.9	<u>scurra</u>	28-47
1.0	<u>venusta</u> (1)	55-80	2.4	<u>mappa</u>	46-85
1.7	<u>decipiens</u>	48-58	0.8	<u>valentia</u>	(79-103)
1.9	<u>friendii</u>	46-90	2.7	<u>mauritiana</u>	53-94
1.7	<u>thersites</u>	67-80	1.2	<u>nivosa</u>	38-66
0.3	<u>marginata</u>	(47-59)	0.6	<u>broderipii</u>	(67-76)
0.0	<u>rosselli</u>	(49)	0.3	<u>leucodon</u>	(78-83)
2.0	<u>mus</u> (2)	31-47	1.8	<u>aurantium</u>	86-108
2.2	<u>testudinaria</u>	80-134	2.4	<u>argus</u>	53-92
3.5	<u>isabella</u>	17-34	2.5	<u>talpa</u>	45-85
2.1	<u>mexicana</u>	29-44	1.5	<u>exusta</u>	58-84
1.8	<u>pulchra</u>	27-59	3.2	<u>tigris</u>	59-120
2.6	<u>cinerea</u>	18-34	2.8	<u>pantherina</u>	49-85
2.6	<u>lurida</u>	19-51	3.1	<u>lynx</u>	24-47
1.9	<u>tessellata</u>	20-35	2.8	<u>vitellus</u>	28-71
2.2	<u>stercoraria</u>	36-80	1.8	<u>camelopardalis</u>	39-71
2.6	<u>zebra</u>	44-105	1.9	<u>ventriculus</u>	35-61
1.8	<u>cervus</u>	63-134	3.5	<u>carneola</u>	20-44
2.1	<u>cervinetta</u>	43-86	1.8	<u>leviathan</u>	54-86
3.3	<u>arabica</u>	35-71	2.0	<u>sulcidentata</u>	30-54
2.3	<u>grayana</u>	32-68	2.0	<u>schilderorum</u>	24-38
2.5	<u>histrio</u>	45-71	1.7	<u>reevei</u>	28-40
2.1	<u>maculifera</u>	42-72	2.0	<u>mariae</u>	10-17
2.4	<u>depressa</u>	28-43	2.5	<u>globulus</u>	11-21
			2.6	<u>bistrinotata</u>	12-20
			2.4	<u>cicercula</u>	12-20
			2.5	<u>margarita</u>	10-16
			2.1	<u>childreni</u>	13-23
			1.4	<u>surinamensis</u>	25-36
			3.9	<u>annulus</u>	14-24
			2.9	<u>obvelata</u>	13-22
			3.6	<u>moneta</u> (3)	14-28
			2.1	<u>irrorata</u>	9-14
			1.7	<u>dillwyni</u>	11-14
			1.2	<u>beckii</u>	8-12
			0.8	<u>macandrewi</u>	13-17
			2.9	<u>labrolineata</u>	11-20
			1.8	<u>tomlini</u>	12-28
			1.6	<u>cernica</u>	17-27
			1.6	<u>citrina</u>	17-26
			3.1	<u>gangranosa</u>	14-23
			3.1	<u>boivinii</u>	17-28
			1.1	<u>ostergaardi</u>	16-28
			3.3	<u>helvola</u>	15-25
			3.4	<u>caputserpentis</u>	23-35
			1.9	<u>caputdraconis</u>	23-36
			2.0	<u>albuginosa</u>	16-28
			2.4	<u>acicularis</u>	15-26
			2.5	<u>spurca</u>	17-32
			2.8	<u>poraria</u>	13-20
			3.4	<u>erosa</u>	22-38
			2.2	<u>nebrites</u>	19-34
			2.5	<u>ocellata</u>	17-32
			1.7	<u>marginalis</u>	21-31
			2.5	<u>miliaris</u>	24-41
			1.9	<u>eburnea</u>	29-50
			2.4	<u>lamarckii</u>	26-45

2.9	<u>turdus</u>	21-42	3.2	<u>asellus</u>	11-19
1.0	<u>guttata</u>	52-68	2.6	<u>clandestina</u>	11-21
2.9	<u>staphylaea</u>	9-21	2.1	<u>artuffeli</u>	13-20
2.4	<u>limacina</u>	18-30	1.3	<u>saulae</u>	19-27
2.3	<u>semiplota</u>	10-24	1.5	<u>contaminata</u>	9-13
3.0	<u>nucleus</u>	15-25	2.0	<u>lutea</u>	11-22
2.1	<u>granulata</u>	22-34	2.3	<u>ziczac</u>	12-21
2.1	<u>achatidea</u>	25-38	2.3	<u>diluculum</u>	15-31
0.5	<u>langfordi</u>	(50-54)	1.6	<u>lentiginosa</u>	21-32
0.9	<u>hirasei</u>	(40-55)	3.0	<u>gracilis</u>	11-21
0.3	<u>teramachii</u>	(58-78)	1.7	<u>raysummersi</u> (11)	11-17
2.1	<u>zonaria</u>	23-37	2.3	<u>fimbriata</u>	9-16
1.2	<u>gambiensis</u>	22-28	2.9	<u>minoridens</u>	7-10
2.1	<u>picta</u>	21-34	1.7	<u>serrulifera</u>	6-10
1.0	<u>aequinocialis</u>	36-44	2.2	<u>microdon</u>	7-14
1.8	<u>annettae</u>	26-49	2.3	<u>quadrinaculata</u>	16-25
1.2	<u>spadicea</u>	33-56	1.3	<u>coxeni</u>	15-26
1.5	<u>sanguinolenta</u>	18-25	2.9	<u>pallidula</u>	13-21
1.4	<u>petitiana</u>	18-29	2.6	<u>interrupta</u>	17-23
2.5	<u>pyrum</u>	27-42	1.5	<u>rashleighana</u>	14-27
2.0	<u>robertsi</u>	17-30	1.7	<u>latior</u>	25-40
2.0	<u>arabacula</u>	18-32	3.1	<u>teres</u>	20-31
2.3	<u>nigropunctata</u>	19-34	1.4	<u>subteres</u>	17-27
1.3	<u>fuscorubra</u>	30-44	1.8	<u>goodallii</u>	8-15
2.5	<u>fuscodentata</u>	26-35	2.6	<u>kieneri</u>	10-21
1.6	<u>algoensis</u>	17-27	1.3	<u>owenii</u>	9-20
2.6	<u>edentula</u>	20-28	2.7	<u>hirundo</u>	11-19
0.7	<u>amphithales</u>	(26-30)	2.6	<u>ursellus</u>	8-15
2.5	<u>capensis</u>	28-34	2.4	<u>stolida</u>	19-33
1.9	<u>pulicaria</u>	15-20	1.4	<u>erythraeensis</u>	15-25
2.1	<u>reticulifera</u> (4)	17-23	2.7	<u>cribraria</u>	16-29
1.6	<u>bicolor</u> (5)	19-26	1.7	<u>cribellum</u>	12-18
2.1	<u>piperita</u> (6)	18-25	1.9	<u>esontropia</u>	14-30
2.1	<u>comptonii</u> (7)	20-27	2.0	<u>catholicorum</u>	11-17
1.3	<u>declivis</u>	21-28	1.7	<u>gaskoini</u>	11-26
1.9	<u>angustata</u>	21-30	1.8	<u>cumingii</u>	9-22
2.1	<u>armeniaca</u> (8)	71-104			
1.9	<u>walkeri</u>	18-33			
2.0	<u>pyriformis</u>	19-32			
1.8	<u>pulchella</u>	26-44			
1.2	<u>hungerfordi</u>	31-37			
0.0	<u>barclayi</u>	(26)			
1.7	<u>xanthodon</u>	20-34			
3.2	<u>vredenburgi</u>	16-25			
2.8	<u>pallida</u>	20-29			
2.1	<u>subviridis</u>	24-40			
2.9	<u>onyx</u>	30-51			
2.6	<u>ovum</u>	21-32			
3.2	<u>errones</u>	17-31			
2.3	<u>cylindrica</u> (9)	23-36			
3.0	<u>caurica</u>	26-47			
1.9	<u>coloba</u>	21-33			
2.4	<u>chinensis</u> (10)	25-40			
2.6	<u>listeri</u>	11-20			
2.5	<u>felina</u>	14-23			
1.0	<u>martini</u>	13-17			
2.6	<u>punctata</u>	8-19			

## NOTES:

- 1) Includes episema
- 2) The giant variety has been omitted (see above).
- 3) Includes icterina.
- 4) A synonym prior to occidentalis
- 5) A revision of the genus Notocypraea will be published in another paper; bicolor should replace piperita sensu Griffiths.
- 6) The slender comptonii sensu Griffiths.
- 7) Includes mayi.
- 8) I think armeniaca to be a subspecies of hesitata; by law of priority, the species must be called armeniaca.
- 9) Includes sowerbyana.
- 10) The pathological tortirostris have been excluded.
- 11) Includes some dubious North West Australian shells; the holotype of hammondae possibly belongs to the same species.

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Remarks on a Variation in *Cypraea annettae* DALL, 1909

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(Plate 24)

From the Gulf of California I have what I consider an unnoticed and hitherto unrecognized dwarf form of *Cypraea annettae* Dall, 1909. Despite several morphological differences, it seems to be more closely associated with *C. annettae* than with any of the other known Gulf species of *Cypraea*. However, *C. annettae* is typically much larger, more slender and elongate than this form.

Since the locality data on the three specimens in my collection were vague and indefinite — that is, "Gulf of California" — no attempt was made to work on them further, although the question of their identity had intrigued me for several years. Such an uncertain locality reference, without further substantiation such as the collector's name, for instance, had no value whatsoever as far as a study of the species is concerned. Now, however, after having discovered the exact locali-

ties for three similar specimens, it seems the existence of this variant is important enough to be mentioned. Last April I came across two nearly identical specimens in the collection of the California Academy of Sciences which were accompanied by reliable collecting data. These shells had been collected by Fred Baker at El Coyote Bay and by Dr. Emmett Rixford at San Marcos Island. Both collecting stations are within 15 miles of Mulege, El Coyote to the south and San Marcos Island about the same distance to the north. These two specimens were very kindly loaned to me by Dr. Hertlein for comparison with the three specimens in my collection. An additional specimen has since been discovered in the collection of Mrs. Faye B. Howard of Santa Barbara, California. Mrs. Howard's specimen was collected at Santa Rosalia, in the same general area as the Academy's specimens.

## Explanation of Plate 24

Dorsal and ventral aspects of *Cypraea annettae* and variant.

Figure 1a: variant, ventral aspect. Figure 1b: same, dorsal aspect. Figure 2a: *Cypraea annettae*, ventral aspect.  
Figure 2b: *Cypraea annettae*, dorsal aspect.  
(all figures natural size)

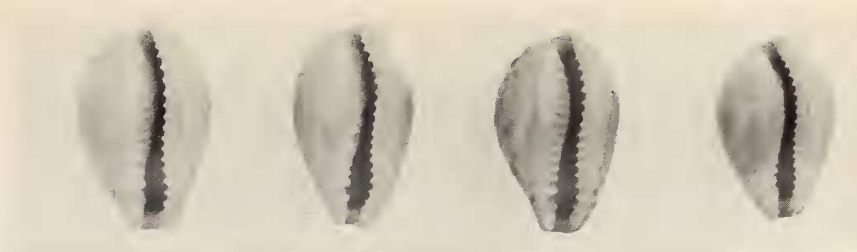


Figure 1 a



Figure 1 b



Figure 2 a



Figure 2 b

